


Cohen's Kappa index to evaluate the use of multimedia in handball sports learning

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ABSTRACT

Objective: To determine the Cohen's Kappa Index to evaluate the level of agreement of experts about the use of Multimedia in learning the sport of handball with respect to the teacher's demonstration. Material and methods: Design: Descriptive study. Random sampling of handball coaches and teachers. Instrument: Closed questionnaire, survey technique. Analysis: Cronbach's alpha reliability coefficient and Kappa index. Results: Cronbach's Alpha = 0.911. Conclusions: The high reliability and existence of concordance of the experts obtained through the Cohen's Kappa Index, the level of significance was: .000, therefore, it is corroborated that there is greater effectiveness in the teaching and learning of sport when the multimedia technological resource is used.

Keywords: Reliability; Cronbach's Alpha; Principles of multimedia.

Cite this article as:

Laínez-Bonilla, J.E., Sánchez-Ramírez, L.C., Martínez-Saravia, N.D., & Laínez-Bonilla, A. (2020). Cohen's Kappa index to evaluate the use of multimedia in handball sports learning. *Journal of Human Sport and Exercise*, 15(4proc), S1446-S1455. doi:<https://doi.org/10.14198/jhse.2020.15.Proc4.41>

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Abstract submitted to: Spring Conferences of Sports Science. [Costa Blanca Sports Science Events](#), 19-20 June 2020. Alicante, Spain.

JOURNAL OF HUMAN SPORT & EXERCISE ISSN 1988-5202

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doi:10.14198/jhse.2020.15.Proc4.41

INTRODUCTION

Currently, expert judgment is a generalized practice that requires interpreting and applying its results in a correct, efficient way and with all methodological and statistical rigor, to allow the evaluation based on the information obtained from the test to be used for the purposes of which was designed. Expert judgment is defined as an informed opinion of people with experience in the subject, who are recognized by others as qualified experts, and who can provide information, evidence, judgments and evaluations.

It will be understood as opinion the judgment that teachers and coaches have on the application of multimedia in the sports field. Based on these concepts, it is clear that opinions are influenced by various aspects of the human being such as: knowledge (understanding of a concept or fact based on intelligence and reason about a specific teaching domain), experience (prolonged practice that provides knowledge or ability to do something), expectations (hope of accomplishing or achieving something), prejudices (previous and tenacious opinions, usually unfavourable, about something that is poorly understood), that teachers and coaches have had or have in relation to the practices of technological resources (Moreno, 2011).

In this regard, the activity of Physical Culture and Sport regarding the use of teaching aids are considered as materials or aids and are to be important components of the teaching-learning process or sports training therefore allow the appropriation of knowledge, the development of skills and abilities of students or athletes; That is why, during physical education classes and specifically in sports practice classes, the use of the media are requirements for the development of these activities.

This is corroborated when the teacher works with suitable means such as photos, videos, has more time to organize and carry out work on individual differences and allows students / athletes to perform more exercise; which has an impact on the cognitive, affective and psychomotor dimensions, which facilitates achieving significant learning; the effectiveness is different if, on the contrary, there is an excess of spoken language on the part of the teacher or coach to explain a physical exercise or technical element of a sport.

In that direction, the objective of this work is expressed in: Determining the Cohen's Kappa Index to evaluate the level of agreement of experts about the use of Multimedia in learning the sport of handball with respect to the teacher's demonstration.

METHODOLOGY

The reference population of the research was constituted by coaches of the sport participating in the study (handball) and teachers of the subject of said sport in the undergraduate of the Physical Culture career. A questionnaire was applied to a sample of 4 teachers and 26 career coaches.

The steps to carry out expert evaluations proposed by several authors such as Skjong and Wentworht (2000) are assumed: (a) Prepare instructions and forms, (b) select experts and train them, (c) explain the context, (d) enable the discussion, and (e) establishing the agreement among experts by calculating consistency. In addition, to clearly instruct the judge in the dimension and the indicator that each item measures.

The representativeness of the sample was determined by various criteria: according to experience in sport and its teaching. The selection of the participants was carried out through simple random sampling.

Measurement instrument (Martínez C., Galán G. (2014)

It was determined that the most appropriate data collection technique was the survey, specifically the questionnaire. In this sense, a reliability test (Cronbach's α coefficient) is carried out, which shows the internal consistency of the survey expressed in a questionnaire. Cohen's Kappa statistic is used to calculate the concordance between judges. This type of research design has several advantages, highlighting its logistical simplicity, simplicity of statistical analysis, and wide applicability in pedagogical settings. There are numerous computer programs capable of calculating the kappa coefficient, this research SPSS Statistics 19 was used.

RESULTS

The kappa coefficient can take values between -1 and +1. The closer to +1, the greater the degree of agreement, on the contrary, the closer to -1, the greater the degree of disagreement.

Table 1. Assessment of the kappa (Landis and Koch, 1977).

Kappa coefficient	Concordance strength
0.00	Pobre (Poor)
0.01 – 0.20	Leve (Slight)
0.21 – 0.40	Aceptable (Fair)
0.41 – 0.60	Moderada (Moderate)
0.61 – 0.80	Considerable (Substantial)
0.81 – 1.00	Casi perfecta (Almost perfect)

Table 1 corresponds to the scale frequently used to qualitatively express the strength of agreement, according to Landis and Koch (1977).

The null (H_0) and alternative (H_1) hypotheses of this test are $H_0: \kappa = 0$ and $H_1: \kappa \neq 0$. Its result indicates whether or not the value of the kappa coefficient is statistically significant, with a certain level of confidence, allowing conducting statistical inference.

Cohen's Kappa. The Kappa Index relates the agreement exhibited by observers, beyond that due to chance.

The kappa coefficient is designed only to estimate the magnitude of the agreement between observers, it expresses the percentage of agreement between them, and that is, to what extent there was agreement in the classification between the observers in relation to the total of elements examined.

With respect to the concept of multimedia, it refers to the combination of various means of communication of information; In the case of the computer, it refers to the use of monitors that allow students to view the information inside or outside the classroom, an auditorium or a projection room.

Multimedia program refers to any software that allows the reproduction of content and information of text, moving graphics, etc. for the visual and auditory canals.

Hypermedia document. It consists of a multimedia application that allows hyperlinks of text or graphics with other hypermedia documents. They are easily accessible, allow greater control by students, it is a permanent, one-way technology and structures large amounts of information.

In the case of video, it is generally used to show content that is difficult to achieve or represent during training. They can be used to show a game situation that occurred in an international championship difficult to explain with the use of words or static images, and that it is also impossible to transfer athletes or students to the venue live. It can be used to record the executions of technical and tactical elements during sports preparation and then the team members evaluate themselves, evaluate each other, and be evaluated by the teacher. Video, despite being very effective, is less economical therefore its use must be well founded.

In this direction, the analysis of the use of multimedia from the psychological, pedagogical and communicative point of view is carried out. From the psychological: greater retention in the memory of the knowledge learned is achieved, the motivation for the contents increases, it stimulates comparison, differentiation, the recognition of technical and tactical errors, greater concentration, attention, relaxation, and establishing creation interests in learning.

Thus, from the psychological point of view, it allows supporting the execution of important mental activities such as descriptions, recognition of the essential, classification and knowledge that are expressed in concepts and judgments. They contribute to bring the emotional factor of knowledge, concentration of attention, relaxation; in general, it contributes to promoting a favourable climate for learning.

From the pedagogical point of view: the student or athlete learns more when it is closer to reality and it is significant to him; The media focus on the socialization of the subject through individuality, the development of the personality of the student or athlete in their sports context allows to relate theory to practice, facilitates the development of tactical thinking by favouring analysis, interpretation, Faced with various situations in the observation of videos that show various situations of games. Consequently, they make it possible to guarantee higher quality sports motor learning, rationalizing the efforts of the teacher or coach and the student or athlete, providing a better use of performance. What allows to form a materialistic scientific conception of the world.

On the other hand, in teaching they relate theory to practice through representation at the level of the cerebral cortex when the potentialities of our sensory organs are used.

From the communicative point of view: with the exchange of information, experiences, experiences and knowledge are shared, which promotes positive influences in interpersonal relationships, for example when it motivates provoking discussions in the observation of executions of technical elements during real game situations through videos, establish comparisons, observations between teams of the same categories but from different countries, where they can assess the form of play in terms of the tactics used in the diversity of situations.

Multimedia principle

Principles for the elaboration of multimedia during the teaching-learning process of handball.

Necessity principle

The software will be used as a multimedia and interactive didactic mediator in the handball teaching-learning process whose need at this time is marked by the lack of a didactic means, in the international framework it is an application whose possibilities are novel enough to be considered a useful product.

On the other hand, for the development of theoretical and practical skills, this medium surpasses textbooks because in these there is the possibility of reading, seeing graphics, the teacher's own explanation,

sometimes they remain in an abstract plane, however, when The different communication channels are used, there is a graphic representation at the level of the cerebral cortex and this has a motor response, which is the technical ability to be achieved. Consequently, it allows the user a better understanding, appropriation and application of technical sports content.

Principle of multiple entries

In this application this principle is fulfilled by showing knowledge in different ways. The different communication channels are used through videos, texts, images. The user can see the content according to the thematic unit, can run the videos, self-evaluate through the realization in practice. In this way, the user will focus his attention on the functionalities that arouse him the most interest (Figure 1).



Figure 1. Multimedia menu. *Source: this research.*

Principle of interactivity



Figure 2. Execution of one of the menu options. *Source: this research.*

This application bases its functionalities primarily on this principle. During the use of this product, the user will be able to guide their own navigation according to their needs, conceived in a logical way and based on the principles of pedagogy and psychology, they will be able to make use of the system's functionalities,

approach the execution process to email where you can communicate the advantages or disadvantages caused by the medium, communicate with the electronic sports magazine through the Internet, and thus be able to obtain updated information about the sport under study (Figure 2).

Principle of usability

The product offers some help to the user (Figure 3) from its first presentation by showing what you will see in each selected option, it provides a volume controller where the user can manage this resource at their convenience.



Figure 3. Executions of the tactic. *Source: this research.*

Principle of freedom

In the multimedia, the user can know at each moment of the program where they are and have the possibility of moving according to their preferences: backward, forward, also being able to use hypertexts, videos. From each page there is a path (respecting pedagogical principles) that allows access to all the others.

Attention principle

This resource is conceived to keep the user's attention, each screen has the images, the texts with sufficient clarity, the information is well organized in a logical sequence, the system environment in general was conceived on the reproduction of elements of the computing familiar to the student. The knowledge is structured according to the pedagogical principles of the didactic guides in such a way that the users face them with sufficient preparation, the simulators conceived so that the user is motivated and has permanent attention in each execution of the same.

Vitality principle



Figure 4. Video running offensive elements. *Source: this research.*

Use multiple animations (Figure 4) that reinforce the assimilation pathways of the content Sánchez (2009). Additionally, a mascot is included, which emphasize the actions or processes carried out, such as the dribble.

Methodological phase for the use of multimedia

This phase constitutes the materialization of how to use the Medium, so it arises:

Two moments:

First moment: teacher preparation (to use the medium).

Second moment: employment in the class or training unit.

Organization of the activity, programs roll in terms of information that will provide the student or athlete.

The tasks that she will propose, how they should be carried out, the role of the students or athlete: if she is free, according to her initiative, carrying out the activities in which she feels the most interest; semi-directed: you can use the material as you want, but with the purpose of developing a specific job or a project commissioned by the teacher or coach; directed, following the specific instructions of the teacher or coach.

The proposed multimedia contributes to the learning of handball by offering videos for use in training sessions during a period of 10 sessions corresponding to a macrocycle. In addition, it allows developing the level of acquisition of the content of sports training. Improvement of visual skills to performance in sport and has a tangible impact on the performance of the player, since it is achieved that there is a representation at the level of the cerebral cortex which affects the development of motor skill.

In addition, the photos and videos contained in the multimedia allow feedback from players, which favour both the teaching of the technique and its improvement and allows the analysis of the game for decision-making during training.

All of the foregoing allows affirming the contribution of the multimedia technological resource both in university teaching and during the training process of the sport under study.

In addition, the interactions of each student: with the program, with other classmates: consultations, opinions, comments; with the teacher: consultations, guidance, help; with other materials: various sources of information, guides.

The learning techniques that will be used: elaborative (relating the new information with the previous one): underlining, summarizing, schematizing, and elaborating diagrams and concept maps, exploratory: exploring, experimenting (verifying hypotheses, trial-error ...), regulative (analysing and reflecting on their own cognitive processes, metacognition).

The role of the teacher or coach must be taken into account: initial information to students (objectives, work to be done, materials and methodology, sources of information), guidance and monitoring of the work (dynamization, advice and guidance). Teaching techniques that will be used: motivation, practice for the acquisition of procedural skills, directive teaching, guided exploration, guided experimentation, personal discovery, personal expression, interpersonal communication, metacognition.

From this proposal, a statistical-mathematical method is applied: techniques of descriptive statistics of central tendencies, Cronbach's Alpha and the Kappa Index.

The general Cronbach's Alpha for the study was 0.911, which is why the high level of reliability of the applied survey is considered (Table 2).

Table 2. Reliability statistics of the survey applied on compliance with the principles of the proposed multimedia.

Cronbach Alpha	Elements
.911	7

The data processing (Table 3) was based on techniques of the descriptive statistics of central tendencies; the evaluations about the principles of the proposed multimedia are analysed.

Table 3. Statistics about the evaluations about the principles of the proposed multimedia. *Source: this research.*

	Interactivity	Need	Usability	Multiple entry	Freedom	Attention	Vitality
N Valid	30	30	30	30	30	30	30
Median	3.87	4.0	4.33	4.10	4.63	3.90	4.10
Mode	4	5	5	4	5	4	5
Typ. Dev.	0.629	0.466	0.758	0.712	0.490	0.759	0.923
Minimum	3	4	3	3	4	3	2
Maximum	5	5	5	5	5	5	5

The Kappa statistic is applied, which generates a measure of agreement between evaluators who have an adequate level of knowledge in the area referred to the level of acceptability of the multimedia; in this direction a contingency table is determined (Table 4). Kappa (K) statistic for data on nominal scales. This reported the degree of agreement between evaluators regarding the greater effectiveness of the use of multimedia with respect to the teacher / coach demonstration during teaching-learning and / or sports training.

Table 4. Multimedia contingency table * Teacher's demonstration. *Source: this research.*

			Teacher demo		
			More efective	Less effective	Total
Multimedia	More effective	Count	0	27	27
		% of the total	0.0%	90.0%	90.0%
	Less effective	Count	3	0	3
		% of the total	10.0%	.0%	10.0%
Total		Count	3	27	30
		% of the total	10.0%	90.0%	100.0%

The hypothesis is expressed in:

(Null) H0: The degree of agreement is 0, that is, there is no agreement.

(Alternative) H1: There is a significant agreement between evaluators, that is, $K > 0$.

H0 is rejected because the observed value exceeds the critical value (with an α of .05). The SPSS (Table 5) indicates the level of significance of: .000 and as it is less than .05, the H0 is rejected and it is concluded that there is agreement between the evaluators as to which greater effectiveness is obtained for the teaching of sport using the multimedia that with the teacher's demonstration, the value of k provides the proportion of agreement, with a confidence level of 95% (Table 5).

Table 5. Symmetric measurements. Source: *this research*.

	Value	Tip. Error asint. ^a	T approximate ^b	Sig. approximate
Kappa Measurement	-.220	.130	-5.477	.000
Valid Cases	30			

Note. a: Indicates that the alternative hypothesis (that of the researcher) is being assumed, which refers to the existence of agreement between the evaluators. b: means that the obtained value is calculated through the data.

DISCUSSION

It agrees with the studies carried out by Rivilla-García, J. ; Sillero, M. ; Grande, I. ; Sampedro, J. and Gómez, M.A. (2014) based on the analysis carried out regarding the positive effect of the insertion of multimedia resources in the training of handball players. Furthermore, this proposal specifies the need to assess the application of the multimedia technological resource not only in its technological aspects but also in its didactic integration.

Definitely, reflecting that in frequent practice teachers do not apply interactive multimedia resources in sports teaching in the intended way, a multimedia has been developed that provides how to use, in what way as well as activities specifically in sport, supported by of precise objectives that these in turn facilitate the fulfilment of the implementation of said resource from the doing, based on authors such as: Rivilla-García, J.; Sillero, M. ; Grande, I. ; Sampedro, J. and Gómez, M.A. (2014); González and Acosta (2015); Torres, L. L. (2015); Peralta (2016); Pueo, B., & Jimenez-Olmedo, L. M. (2017); Guillen, Herrera, de la Rosa (2018); that previously illuminated the investigation and corroborated by the experts who evaluated the proposal.

Finally, considering that in daily practice, although receptive capacity is recognized as the most benefited over productive capacity when digital resources are used, even teachers do not apply interactive multimedia tools in sports training as expected.

CONCLUSIONS

1. The experts' assessment highlighted the relevance of the multimedia technological resource, as the principles that are met in the proposal made were satisfactorily assessed. These experts confirm the influence of this resource as support for the teacher or coach for the analysis of the game, the appropriation of concepts and skills, as well as improving the result of the teaching-learning process, this result coincides with previous research which confirms the relevance of the use of technological tools for the sports context.
2. The superiority of the use of Multimedia in learning the sport of handball with respect to the teacher's demonstration was determined from Cohen's Kappa Index.
3. There are aspects that refer in the expert judgments that become difficult to be controlled by the researcher. It is considered that it was possible to provide the appropriate context for obtaining information from the experts, which made it possible to request additional opinions that were not evaluated in the trial. However, despite obtaining a high level of agreement regarding the usability of multimedia for teaching sports, it is necessary to continue reviewing, updating and improving the valued proposal from the sports training process.
4. It is feasible to use it as an elective subject, which facilitates self-learning of the technical elements of the sport under study.

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